INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 17

February 1973

MICROBIAL TOXINS IN FOODS

SELECTED FROM VOLUME 4
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

PRICE £2.00

sponsored by

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Institut für Dokumentationswesen, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen; Zentralstelle für maschinelle Dokumentation, Frankfurt am Main.

Additional Services available from IFIS

CURRENT AWARENESS SERVICE

- Monthly searches of FSTA
- Personalized, computer assisted service
- Information available in 3 output formats
- Cost from £10 per year for references; £15 per year for abstracts
- Information selected to match your requirements on any aspect of Food Science and Technology

MAGNETIC TAPES

- Contains all information in FSTA, bibliographic data, abstracts, author and subject indexes
- 7– and 9– track IBM tapes available
- "Clean" tapes suitable for computer retrieval
- Cost £700 per year

Enquiries concerning the magnetic tape service should be addressed to;–

Dr. U. Schützsack
Institut für Dokumentationswesen,
6 Frankfurt/Main-Niederrad,
Herriostrasse, W. Germany.

See also back page

1 B 9
[Epidemiological and bacteriological examination on nine outbreaks of food poisoning due to heat resistant Clostridium perfringens in Tokyo.]
Zenyoji, H.; Sakai, S.; Itoh, T.; Murayama, T.; Kudoh, Y.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 11 (4) 282-291 (1970) [15 ref. Ja, en] [Tokyo-to Lab. for Med. Sci., Shinjuku-ku, Tokyo, Japan5

Epidemiological and bacteriological examinations were carried out for the 9 cases of food poisoning caused by the heat resistant Clostridium perfringens, which broke out in Tokyo during 1963-1969. The organism which was the same as Cl. perfringens detected from the faeces of the patients, was detected from the incriminated foods in concn. level of 1 × 103 to 1 × 106 organisms/g of food. The heat resistant Cl. perfringens was found in the faeces of more than 90% of the patients in the initial stage of illness. The incriminated foods were always allowed to stand at room temp. for several h after cooking. The incubation period of this food poisoning was 7-16 h, and the main symptoms of the most of the patients were diarrhoea and abdominal pain. A new type TW 4 organism was found in one of the 9 cases. In the other cases, several types of the organism such as Hobbs 1, were found. TM

1 S 2
Microbiological quality control in the meat industry.
Nottingham, P. M.
Publications. Meat Industry Research Institute of New Zealand M.I.R.I.N.Z. 217: 1-56 (1971) [110 ref. En] [Meat Ind. Res. Inst. of New Zealand (Inc.), P.O. Box 617, Hamilton, New Zealand]

Bacteria producing various forms of spoilage (off-odours and slime, rancidity, bone-taint), the types of food poisoning (staphylococcal, botulism, Clostidium perfringens, salmonellosis), other food-borne diseases, the importance of animal hygiene before slaughter, prevention of contamination of slaughtered meat, plant and equipment sanitation, factors affecting microbial growth (temp., available moisture, redox potential, gaseous inhibitors, acidity), and drafting of standards for microbial quality, are considered in this account. Standard procedures for quality control are given in appendices. PEG

2 B 16
Methods in microbiology. Vol. 5A. [A book]
Norris, J. R.; Ribbons, D. W. (Editors)
xiii + 450pp. ISBN 0 12 521505 3 (1971) [Numerous ref. En] London, UK: Academic Press. Price £7.75

This volume of the series is concerned with the direct observation of whole cells or organelles and contains chapters connected with direct microscopic methods, antigen/antibody studies, toxin/antitoxin assays, techniques used in handling experimental animals, detn. and hybridization of microbial RNA and DNA, and cell wall preparation and examination. The disintegration and chemical analysis of cells, and techniques used to separate and characterize their components, are dealt with in Volume 5B. CDA

2 B 17
Microbiology and food. [A book]
Ford, B. J.
vii + 212pp. (1970) [En] London, UK: Northwood Publications Ltd. Price £2.10 (Hardback) £1.75 (Paperback)

This well illustrated book attempts to integrate the subjects of microbiology and foodstuffs. It contains chapters on: The cell's nutritional needs (pp. 1-33); The cell as food (including the effects of cooking on animal and plant tissues and on prepared foods) (pp. 34-47); The nature of organisms (viruses, bacteria, culture techniques, identification of bacteria, fungi, protozoa, parasitic worms, insect pests and parasites, vertebrate pests) (pp. 48-102); Organisms and their products in the service of mankind (including brief mention of fungi as food, bread baking, brewing of beer, production of wines, vinegar, yoghurt, cheese, fermented plants and vegetables) (pp. 103-116); Damage to foodstuffs (including spoilation, food poisoning mechanisms, contamination in practice) (pp. 117-165); and Control (pp. 166-195). Appendices are included on food values of representative animal foodstuffs and food consumption in UK. AL

2 C 31
A review of collaborative studies of the microslide gel diffusion test for the detection of serologically identifiable staphylococcal enterotoxins.
Bennett, R. W.
Journal of the Association of Official Analytical Chemists 54 (5) 1037-1038 (1971) [6 ref. En] [Div. of Microbiol., FDA, Washington, DC 20204, USA]

The high specificity of the microslide gel diffusion test far outweighs the more sensitive, but less specific, agglutination procedures for detection of serologically identifiable staphylococcal enterotoxins. Results of collaborative and interlaboratory studies during the past 2 yr on detection and identification of staphylococcal enterotoxins indicate that a high degree of sophistication and serological expertise is needed for proper test performance. Results showed that the test has a high degree of utility for those persons who have extensive training in manipulation of this technique or a strong background in serological procedures. Since the microslide gel diffusion test, as well as any other serological procedure, is so dependent on the training and experience of individuals who perform analyses, there is no justification for continued collaborative studies on this procedure. Therefore, this project is being held in abeyance until other tests are available for comparative collaboration in detection of this microbial toxin. AS

2 C 49
Analysis of staphylococcal enterotoxin B by the polyacrylamide electrophoresis technique.
Baier, H. L.
Applied Microbiology 22 (2) 214-219 (1971) [21 ref. En] [Med. Sci. Lab., Fort Detrick, Frederick, Maryland 21701, USA]

The electrophoretic mobility of enterotoxin B was investigated through the use of the disk

electrophoresis technique. Ideal patterns were developed with a 7.5% acrylamide gel system (pH 4.3). The toxin can be separated and identified from other complex proteins such as serum or from suspect samples of foods by this technique. The technique can be used as an assay method for the toxin as well as to elucidate physical changes in the toxin due to temp. The method should not be considered exclusive for enterotoxin B. AS

2 C 50
[Process for the preparative isolation of Staphylococcus-enterotoxin from food products.]
Verfahren zur präparativen Isolierung von Staphylokokken-Enterotoxin aus Lebensmitteln.
Stojanow, I. M.; Schenk, E. (Germany, E., Institut für Milchforschung Oranienburg)
West German Patent Application 1 598 610 (1971) [De]

A qualitative and quantitative test for Staphylococcus enterotoxin in food products is carried out by firstly extracting the toxin with $Na_2NPO_4.7H_2O$ at pH 4.0-7.5. The resulting buffer extract is heated for 30-60 min at 80-100° C and an acid precipitation is effected using 0.5 parts of Esbach reagent/4 parts of the sample. After centrifuging, the resulting extract is rested for 1 h and then fat is removed at 4° C. The pH is adjusted to 5.0-7.0 and the substance is centrifuged for ~20 min at 10 000 rev/min. The resulting yellow liquid is dialysed and conc. 5-10-fold using dextran or a polymer. The dialysed concentrate is then passed through a dextran or polymer bed acting as a molecular filter, and the pure enterotoxin obtained is also concentrated 5-10-fold with dextran or a polymer. W&Co

2 P 234
[Pathogenic staphylococci in dried milk.]
Cerjero del Agua, S.; Suarez Fernandez, G.
Lait 51 (505/506) 294-301 (1971) [17 ref. Fr, en]
[Fac. Vet., Univ., Leon, Spain]

168 samples of dried milk from Spanish dairies were tested for staphylococci using a selective NaCl/lactose/acid fuchsin medium; isolates were subjected to biochemical tests, phage-typing and enterotoxin detection. 104 staphylococcal strains were isolated, of which 24 were coagulase-positive. 6 of the coagulase-positive strains reacted with type A and 1 of these also with type D antisera. Coagulase positive staphylococci multiplied in conc. milk (35-45% DM) during incubation at 35-45° C, from 10^4/cm³ initially to ~10^9 and ~10^7/cm³ after 2 and 4 h respectively. The staphylococci multiplied rapidly in 10% reconstituted dried milk, even at room temp.; samples initially containing 10^1 staphylococci/cm³ contained 10^9 and 10^9/cm³ after 8 and 24 h respectively at 15° C. Phage-typing showed that strains of animal as well as human origin were isolated from the dried milk samples. It is considered that staphylococcal enterotoxin could only occur in the final product if the conc. milk is held at 35-45° C for >4 h before drying. CDA

3 B 30
[Some problems concern' standards for food.]
Ormay, L.;
Elelmezesi Ipar 25 (3) 74-79 (1971) [47 ref. Hu, ru, de, en]

The incidence of food poisoning caused by bacteria has been steadily increasing in Hungary. Between 1960 and 1969 a total of 1704 outbreaks of bacterial food poisoning was recorded. Of these 21.5% were caused by Salmonella, 1.2% by obligate pathogens (enteropathogenic Escherichia coli, Shigella, Clostridium botulinum), 60.0% by Staphylococcus, and 17.3% by conditional pathogens (Bacillus cereus, Cl. perfringens, Streptococcus faecalis, Proteus, Klebsiella, Pseudomonas aeruginosa, E. coli). Suggestions are made for improving conditions in food factories and shops and for standardizing bacteriological analysis. Problems relating to Hungarian standards for bacteriological quality of foods are discussed. IF

3 B 31
[Clostridia in food, with special reference to bacteriological studies of meat.] Clostridien in Lebensmitteln unter besonderer Berücksichtigung der bakteriologischen Fleischuntersuchung (BU) [A review]
Levetzow, R.
Archiv für Lebensmittelhygiene 22 (10) 213-220 (1971) [Numerous ref. De] [Bundesgesundheitsamt, Max von Pettenkofer Inst., Abteilung für Veterinärmed., Berlin-Dahlem, W. Germany]

The classification, occurrence and identification of clostridia in foods and their significance in food hygiene are reviewed. They are chiefly found in the soil, and also in human and animal intestines. In foods, they produce proteolytic and/or saccharolytic enzymes, and sometimes also non-specific poisons. The incidence, diagnosis, prevention and treatment of botulism are discussed. HSi

3 P 344
Production of staphylococcal enterotoxin A in Cheddar and Colby cheese.
Tatini, S. R.; Jezeski, J. J.; Morris, H. A.; Olson, J. C., Jr.; Casman, E. P.
Journal of Dairy Science 54 (6) 815-825 (1971) [24 ref. En] [Dept. of Food Sci. and Ind., Univ., St. Paul, Minnesota 55101, USA]

15- to 18-h cultures of 2 strains of Staphylococcus aureus, capable of producing enterotoxin A but differing in heat and penicillin sensitivities, were inoculated together with normal or phage-inhibited starter cultures into milk for Colby and Cheddar cheese manufacture. Results showed that enterotoxin could be produced in normal cheeses as well as in those with starter failure. Detectable amounts of enterotoxin A occurred more frequently in Colby than in Cheddar cheeses, both made with normal starter; from initial inocula of 35 000-250 000 Staph. aureus/ml milk, enterotoxin A was detected when Staph. aureus count had increased to 15 million/g in Colby or 28 million/g in Cheddar cheeses. Phage-induced starter failure prior to or at draining resulted in extensive growth of Staph. aureus and enterotoxin A was detected at Staph. aureus levels of 3-5 million/g. The influence of titratable acidity at milling,

final moisture and pH contents, and redox potential on enterotoxin A production in cheese is discussed. It is concluded that if the Staph. aureus count of milk at the beginning of Cheddar cheesemaking is <1000/ml and the titratable acidity of the whey at milling is >0.5%, the cheese is unlikely to contain enterotoxin. [See also FSTA (1971) 3 8P1266.] CDA

3 R 106
Fish inspection and quality control. [A book]
Kreuzer, R. (Editor)
xvi+290pp. (1971) [Numerous ref. En, fr, es]
Influence of bacteriological standards on the quality of inspected fisheries products, by N. Neufeld (pp. 234-240, 20 ref.); Fish plant water supplies, by W. J. Brownlee (pp. 241-243); Food poisoning in Japan caused by poisonous fish, by T. Kawabata (pp. 243-245, 9 ref.); Survival and growth of pathogenic bacteria in seafoods by J. Liston, J. R. Matches & J. Baross (pp. 246-249, 13 ref.); Seafoods and botulism, by J. T. Graikoski (pp. 249-255, 28 ref.); Ultrasonic inspection of parasitized whole fish, by M. Freese (pp. 256-262, 9 ref.); Infestation of fish in Brazil with Tetrarhynchus fragilis larvae, by C. A. M. Lima dos Santos & E. P. V. Zogbi (pp. 262-264, 8 ref.); Food safety programmes of the World Health Organization, by F. C. Lu (pp. 264-265, 6 ref.); The training of fishery inspectors, by J. Walls (pp. 270-274, 11 ref.); Training and evaluation of trainees for the organoleptic assessment of fishery products for quality control laboratories, by S. Varga (pp. 275-276, 6 ref.); Fish quality and the Fishery School at Grande-Riviere, Quebec, by L. J. Berube (pp. 277-279, Fr, en, es); International standards for fish and fishery products (Codex Alimentarius), by O. R. Braekkan (pp. 284-287); and Codes of practice for fish and fishery products, by R. Kreuzer (pp. 287-290). AL

3 S 331
Modern developments in pig meat curing. [A symposium]
Patton, D.
IFST Proceedings 4 (3, part II) 155-162 (1971) [27 ref. En] [Ulster Curers' Assoc., Belfast, UK]
It is noted that permitted amount of nitrate in cured meat products ranges from 2000 ppm in Australia and the Netherlands to 150 ppm in France, and that of nitrite from 500 ppm in the Netherlands to zero in Germany. Pig breeding has concentrated on fat/lean ratio, light shoulder, long back and lean plump ham. Backfat thickness has decreased from 40.5 mm in 1926-27 to 23.4 mm in 1968-69, and body length has increased from 889 mm to 964 mm. A tendency towards pale soft exudative muscle in leaner carcasses has been noted, but effects of this can be minimized by correct ante mortem treatment. Mechanization of slaughter and processing has proceeded rapidly, with chilling capacity of the carcasses being the limitation to throughput. A "thermocure" process involving processing and curing of hot pigs has been reported, with the main advantages being savings in time and space. Curing technology has concentrated on reduction in the curing or maturation period, and increased yield of product from the raw material. Injecting pickle into the carcass before dry curing, reduction in time of immersion in a tank from 2-3 wk to 7-10 days, artery pumping of brine, development of an automatic brine injector, the "tumbling" technique, and slice curing are examples of how this has been brought about. Vacuum packing of cured meats has altered spoilage microflora found from Micrococcus, Vibrio, Acinetobacter and Alcaligenes to the lactic acid bacteria. Food poisoning due to Staphylococcus aureus is possible in vacuum packed bacon stored at >25°C. Preference for milder cured bacon has resulted in the product becoming microbiologically more unstable. Action of some additives (ascorbic acid, polyphosphates) on the product is mentioned. Future developments of the industry are briefly discussed. PG

3 U 144
Botulinum toxin. Determination in foods.
Nordic Committee on Food Analysis
Nordic Standard 79: 4pp. (1971) [En & No] [Danish Technical Press, 4 Skelbaekgade, DK-1717, Copenhagen V. Denmark]
The toxin is eluted from the suspect food and demonstrated, after centrifugation or filtration, by injection of 0.2-1.0 ml into experimental animals. Final identification is made by neutralization with solutions of specific antitoxins of the different types of Clostridium botulinum. HBr

4 B 42
[Staphylococci food. enterotoxicosis. (In "Microbiologia. Vol. I".]
Stojanov, I. [Stoyanov, I.]; Meeser. G.
pp. 345-351 (1968) [26 ref. De, ro] [Tech. Forschungsinst. für Fleischwirtschaft, Sofia, Bulgaria]
Prepared and unprepared foods (including meat products, butter, cream cake, potato salad, nut ice, and infant preparations), which were sampled routinely or left over after certified outbreaks of food poisoning, were examined for toxin levels. Isolated strains of staphylococci were phage-typed and submitted to standard physiological tests. >84% of the staphylococci were coagulase positive, formed enterotoxin and produced hyaluronidase and haemolysin. ~16% were coagulase negative and produced enterotoxin but were also hyaluronidase and haemolysin negative. BR

4 C 79
[Classification of food poisonings and its principle.]
Vankhanen, V. D.; Denisov, K. A.; Artemov, A. A.; Sitnikova, G. M.; Shaptala, V. A.; Khilinskii, V. P.
Voprosy Pitaniya **30** (6) 54-58 (1971) [10 ref.

Ru, en] [Kafedra Gigieny Pitaniya, Donetskii Med. Inst., Donetsk, USSR]

Food poisonings are classified into those of (i) bacterial, (ii) non-bacterial, (iii) fungal and (iv) obscure origin. (i) is subdivided into toxinfections and bacterial toxicoses; (ii) is subdivided into poisonings due to admixtures to food products and dishes, poisonings due to inedible substances and poisonings due to products which have become temporarily or partly toxic. SKK

4 C 88

[Staphylococci and their importance for the food industry.] Staphylokokken und ihre Bedeutung für den Lebensmittelbetrieb. [Conference proceedings]

Switzerland, Gesellschaft für Lebensmittelhygiene

Alimenta **10** (1) 5-35 (1971) [223 ref. De]

Papers presented at the Sept. 1970 meeting of the Swiss Society for Food Hygiene in Rüschlikon were: What are staphylococci?, by W. Rizerfeld (pp. 5-12, 13 ref.); Staphylococcal enterotoxins and their serological detection, by H.-J. Sinell (pp. 13-19, 78 ref.); Cultural detection of staphylococci in foods, by J. de Waart (pp. 19-21, 24 ref.); Epidemiology of staphylococcal food poisoning, by F. J. Müller and I. Stojanow (pp. 22-27, 59 ref.); and Phage-typing of staphylococci, by w. Gedek (pp. 28-35, 49 ref.). FWJ

4 C 89

Staphylococci control and the food processor. [A review]

Figueiredo, M. P. de

Journal of the American Dietetic Association 58 (2) 109-114 (1971) [33 ref. En] [Kitchens of Sara Lee, Deerfield, Illinois, USA]

The significance of staphylococci in foods and the preventive measures that might be taken to prevent staphylococcal food poisoning are discussed. Results of a survey on the incidence of food-borne illness (bacterial, parasitic and other), for 1966-1968 are tabulated. Symptoms and causes of staphylococcal poisoning, and methods of detection and control are briefly considered. VJG

4 C 97

[Hygienic and toxicological evaluation within the framework of food legislation in relation to environmental toxicology.] Die hygienisch-toxikologische Bewertung im Rahmen des Lebensmittelgesetzes in Beziehung zur Umwelttoxikologie.

Bär, F.

Deutsche Lebensmittel-Rundschau **67** (11) 389-396 (1971) [24 ref. De] [Max von Pettenkofer-Inst. (Bundesgesundheitsamt), 1 Berlin 33 (Postfach), Germany]

Additives, plant protective agent residues, residues of pharmacologically active veterinary drugs, and chemical impurities in foods and their tolerance limits are generally discussed with reference to acute toxicity, carcinogenic effect, teratogenic effect, resorption, excretion, allergic effect, build-up of toxic substances through enzyme activity, biochemical and physiological effects, effect on intestinal flora, pharmacologically active plant constituents, induction of toxic substances in plant material through infection by microorganisms, toxic product of bacterial metabolism, trace elements, organochlorine compounds, and production, storage, transport and processing of food fats. The difficulties in characterizing the toxic properties of the thousands of synthetic chemical compounds together with natural constituents and ubiquitous substances are emphasized, and animal experiments and their significance in health protection discussed. OA

5 C 108

Bacterial food poisoning in Australia - a changing problem.

Sutton, R. G. A.

Food Technology in Australia **23** (12) 596-597, 599 & 601 (1971) [17 ref. En] [School of Public Health and Tropical Med., Univ., Sydney, NSW, Australia]

Current aspects of the epidemiology and prevention of food poisoning, with special reference to the situation in Australia, are considered. Incidence of bacterial food poisoning and types of food responsible in Australia, the UK and USA are outlined. The epidemiology of the 3 main types of bacterial food poisoning occurring in Australia, i.e. that due to Salmonella spp., Staphylococcus aureus and Clostridium welchii, is discussed. AB

5 C 109

Current aspects of food poisoning and food hygiene. [A lecture]

Hobbs, B. C.

Journal of the Society of Dairy Technology **25** (1) 47-50 (1972) [15 ref. En] [Central Public Health Lab., Colindale Ave, London NW9 5HT, UK]

5 C 115

[Methods for the study of toxic and teratogenic substances in foodstuffs.]

Billon, J.

Recueil de Medecine Veterinaire de l'Ecole d'Alfort **147** (11) 1259-1272 (1971) [12 ref. Fr, en, es] [Lab. des Abattoirs de La Villette, Paris, France]

Because of the many new methods of preparation and preservation of foodstuffs it is necessary that new experimental programmes be devised for the study of toxic and teratogenic substances in foodstuffs. One such programme is

covered and comprises (a) study of acute toxicity, (b) study of chronic toxicity, and (c) study of teratogenic action. In (b), the main difficulties are choice of test animal and the amounts of food the animal can absorb daily; the preferred animals are rats. In (c), rats are also preferred and special emphasis is placed on hereditary and embryonic factors. There are 3 stages of embryonic development: (i) blastogenesis when teratogenic action produces death and abortion, (ii) embryogenesis when it produces malformations, and (iii) foetogenesis when it produces modifications in the external genital organs and retards development. The experiments are outlined and this section includes a discussion of experimental protocol, methods, etc. as well as interpretation of results. LA

5 C 124

Effect of pH, protein concentration, and ionic strength on heat inactivation of staphylococcal enterotoxin B.

Jamlang, E. M.; Bartlett, M. L.; Snyder, H. E.

Applied Microbiology **22** (6) 1034-1040 (1971) [13 ref. En] [Dept. of Food Tech., St. Univ., Ames, Iowa 50010, USA]

H 790

Outbreak of botulism caused by preserved tomato juice.]

Popugailo, V. M.; Zhuravskaya, S. P.; Taroshevskaya, E. E.; Sukhakova, V. I.; Zhukova, . N ; Kon'shina, T. A.

Gigiena i Sanitariya **37** (2) 97-99 (1972) [2 ref. Ru] [Sverdlovskaya Oblastnaya Sanepidstantsiya, SSR]

An outbreak of botulism in the town of Nizhnii agil was found to be caused by preserved tomato uice produced at the Oktemberyan Preserves actory (Armenian SSR). Salt content of the juice anged from 0.3 to 2.1% (although the regulations o not envisage addition of salt), the pH varied om 3.8 to 4.5, visual defects (discoloration and ecculation) were observed and some of the ontainers (large bottles) were not sealed ermetically. HBr

P 693

Hygienic significance of pathogenic staphylococci nd their toxins in dried milk.]

Prieto del Agua, S.; Suarez Fernandez, G.; Santos, A.

Microbiologia Espanola **24** (4) 287-302 (1971) [5 ref. Es, en] [Fac. Vet., Catedra de Microbiol. e Inmunologia, Leon, Spain]

See FSTA (1972) 4 2P234

R 248

Effects of sodium chloride on outgrowth and toxin production of Clostridium botulinum Type E in cod homogenates.

Boyd, J. W.; Southcott, B. A.

Journal of the Fisheries Research Board of Canada **28** (8) 1071-1075 (1971) [18 ref. En] [Fisheries Res. Board, Vancouver Lab., Vancouver 8, British Columbia, Canada]

NaCl tolerance of Cl. botulinum type E strains Minnesota, Saratoga, and Tennessee was determined in heat-processed cod homogenates prepared from fresh-frozen Pacific cod (Gadus macrocephalus). Homogenates were inoculated with heat-activated spores and incubated anaerobically at 30°C. The Minnesota strain produced a max. toxin titer of 800 MLD (minimal lethal dose)/g in homogenates without added NaCl (control samples); a brine concn. of 3.76% (NaCl content in aqueous phase) inhibited toxin formation in homogenates, but did not inhibit outgrowth and vegetative cell multiplication. A max. titer of 75 MLD was formed by the Saratoga strain in control samples; growth occurred in homogenates with a 3.84% brine content without the formation of toxin. The Tennessee strain produced a max. titer of 1000 MLD in control samples; toxin of low potency was formed in homogenates containing 4.40% brine. A brine concn. of 5.50% in homogenates was sporistatic to the Saratoga and Tennessee strains, but not to the Minnesota strain. Toxin was produced in subcultures prepared from homogenates in which growth was inhibited by NaCl. AS

5 S 642

Use of time-temperature evaluations in detecting the responsible vehicle and contributing factors of foodborne disease outbreaks.

Bryan, F. L.; McKinley, T. W.; Mixon, B.

Journal of Milk and Food Technology **34** (12) 576-582 (1971) [7 ref. En] [Centre for Disease Control, Health Services and Mental Health Administration, Public Health Service, Dept. of Health, Education and Welfare, Atlanta, Georgia 30333, USA]

Investigation of an outbreak on Clostridium perfringens foodborne illness indicated that turkey or turkey dressing prepared in a school kitchen was responsible. When turkey was again prepared in the kitchen, a bacteriological survey and time-temp. evaluation were made of thawing, cooking, chilling, and reheating to which turkey, stock, or dressing was subjected. During thawing 22-lb turkeys in plastics wrappers and in paper bags at room temp. for 18 h, neither internal nor surface temp. reached a level at which Cl. perfringens could grow. Cooking turkeys in a steamer or pot of boiling water raised internal temp. to a level lethal to vegetative cells. Stock (in gal jars and a large rectangular pan) and deboned meat (in similar pan) were stored overnight in a refrigerator. During storage, temp. of both were within a range so that Cl. perfringens spores could germinate and vegetative cells multiply for 7-9 h. The stock was later used in dressing, which when baked, reached internal temp. known to destroy vegetative cells of Cl. perfringens. Meat and gravy, when reheated,

did not reach such levels. Cl. perfringens, Staphylococcus aureus, and Salmonella were isolated from raw turkey; Cl. perfringens was isolated from cooked meat, stock, and kitchen equipment. 9 recommendations for heat destruction of vegetative cells, inhibition of bacterial growth during storage, and cleaning and sanitizing equipment are made. These recommendations will help prevent foodborne illness whenever turkey and dressing are prepared. AS

5 U 248
[Delicatessen, semi-manufactured and ready-to-eat products: microbiological examination.]
Poland, Polski Komitet Normalizacyjny
***Polish Standard* PN-70/A-82051** 8pp. (1970) [Pl]

This standard covers the microbiological examination of semi-manufactured and ready-to-eat delicatessen. Standards are presented on: sampling; determination of counts of total bacteria, Proteus spp., moulds and yeasts, anaerobic spore-forming bacilli, Bacillus cereus, and pathogenic staphylococci; determination of coliform titres; detection of presence of salmonellae and shigellae; and demonstration of toxins. 2 appendices deal respectively with media and Gram staining. SKK

6 B 65
Detection of staphylococcal enterotoxin by the gel diffusion test.
Toshach, S.; Thorsteinson, S.
***Canadian Journal of Public Health* 63** (1) 58-66 (1972) [29 ref. En] [Provincial Lab. of Public Health, Univ. of Alberta, Edmonton, Alberta, Canada]

Enterotoxin production and phage type of 133 staphylococcus food-poisoning strains were tested in a variety of foods, mainly meat and marine produce, from food-poisoning incidents in Alberta from 1952-1971, using the microslide gel diffusion test, which gave reproducible results. 53 strains produced one or more enterotoxins, which were identified by precipitation tests with specific antiserum. The toxin is heat-resistant and may remain in the food when the organisms are no longer viable. In the USA 25% of food-poisoning outbreaks are due to staphylococci and the position in Canada is probably similar. OA

6 C 129
Clostridium perfringens enterotoxin. [A review]
Hauschild, A. H. W.
***Journal of Milk and Food Technology* 34** (12) 596-599 (1971) [30 ref. En] [Res. Lab., Food and Drug Directorate, Dept. of Nat. Health and Welfare, Ottawa 3, Ontario, Canada]

6 C 153
[Outbreak of botulism in Norway during the past 5-6 years.]
Hauge, S.
***Norsk Veterinaertidsskrift* 82** (5) 259-261 (1970) [13 ref. No, en]

6 cases of botulism in humans were reported in the period 1964-1970; 4 were due to consumption of rakefish (home-prepared, salted fish), and 2 were attributable to consumption of raw, salted, dried ham. 2 of the fish-linked outbreaks were caused by Type E toxin; the remaining 4 cases were caused by Type B toxin. Clostridium botulinum Type F may have been the cause of an outbreak of food poisoning from consumption of home-prepared, raw, salted, dried sausage. HBr

6 P 852
A case study: effect of mould on growth of coagulase-positive staphylococci in Cheddar cheese.
Duitschaever, C. L.; Irvine, D. M.
***Journal of Milk and Food Technology* 34** (12) 583 (1971) [3 ref. En] [Food Sci. Dept., Univ., Guelph, Ontario, Canada]

A large batch of Cheddar cheese was refused by a food processing plant on the basis of extensive mould growth. The mould belonged to the genus Penicillium. There was a gradual increase in pH from the centre of the cheese (pH 5.48) towards the mouldy surface (pH 7.80). All portions of the cheese yielded staphylococci, and those isolated (100-1000/g) from the subsurface mouldy areas were all coagulase-positive. Coliforms and salmonellae were absent. Aflatoxins could not be detected but the isolated coagulase-positive staphylococci were able to produce enterotoxin D. AS

6 R 304
[Outbreak of Type E botulism in humans after consumption of home-prepared salted fish (rakefish).]
Yndestad, M.
***Norsk Veterinaertidsskrift* 82** (6) 321-323 (1970) [11 ref. No]

6 R 306
[Aetiologically obscure food poisoning after consumption of mussels.]
Rossebo, L.; Thorson, B.; Aase, R.
***Norsk Veterinaertidsskrift* 82** (11) 639-642 (1970) [9 ref. No]

Within a small area of the W. coast of Norway in Nov. 1968, a total of 15 persons fell ill on 3 different occasions after consumption of 15-50 steamed mussels (Mytilus edulis L.). Symptoms were nausea, vomiting, diarrhoea and prostration 3-7 h after ingestion of the mussels. The poisoning was reproduced in volunteers, but extracts from the

mussels were non-toxic when injected into mice. On cultivation from toxic mussels on blood agar containing 3% NaCl, but not on ordinary blood agar, a haemolytic Vibrio or Aeromonas sp. appeared in large numbers when the plates were incubated at 20°C, but not at 37°C. Possible relation between toxic mussels and occurrence of the halophilic, haemolytic bacterium is discussed. AS

6 S 720
[Clostridium botulinum, its growth and toxin formation in canned meat products.]
Bail'ozov, D.
Proceedings of the European Meeting of Meat Research Workers **16B**: 425-436 (1970) [12 ref. Ru]

Changes were investigated in canned meat products following experimental C. botulinum inoculation. It was found that growth and formation of toxins depend on the strain, properties and cultivation conditions of the C. botulinum. Bulged meat cans, bulged meat and vegetable cans and cans without bulging were tested. It was found that A and B types of Cl. botulinum grow in meat cans, forming a toxin and inducing characteristic changes similar to putrefactive decay. In meat and vegetable cans the A and B types did not grow in all cases, their occurrence depends on pH, temp. and presence of possible inhibitors. Cl. botulinum type E grows well in meat and meat and vegetable cans at storage temp. ranging from 15 to 18°C, and in a thermostat at 37°C. STI

6 S 740
[A rapid method of detecting botulinum toxin type C.]
Mezheevski, J. [Mezheevskii, Yu.]
Proceedings of the European Meeting of Meat Research Workers **16B**: 437-452 (1970) [50 ref. Ru]

Biological tests to determine botulinum toxin are rather lengthy. A more rapid determination involves the use of bactolatex and dextran. Sephadex and polyvinyl pyrrolidone only have limited application. A modified immunofluorescence reaction has been developed, use of which makes it possible to determine the toxin in 6 h. STI

7 B 69
The relationship between design of process equipment and microbiological activity.
LaRocca, R.
Chemical Engineering Progress Symposium Series **67** (108) 9-16 (1971) [En] [LaRocca Lab., Dumont, New Jersey, USA]

Environmental factors affecting bacterial growth, classification of bacteria by temp. requirements, effect of various temp. on bacteria, important bacteriological tests, indices of sanitation, and some food pathogens are discussed. A table and prediction formula are presented as a practical and rapid means for approximating bacterial levels for equipment and process designers. Basic information needed in order to effectively design processing equipment e.g. type of process (dry or wet) is listed. Limits for total count, coliforms, staphylococci, salmonellae and enterococci in frozen and precooked foods, dessert powders and gelatin, raw meat, hamburgers and sausages, and frozen desserts and ice-cream are given. PG

7 B 71
[Assessment of Polish Standard PN-65/A-04024 for determining total numbers of coagulase positive staphylococci in food products.]
Malik, K.
Medycyna Weterynaryjna **27** (11) 692-694 (1971) [8 ref. Pl] [Wojewodzka Sta. Sanitarno-Epidemiologiczna, Krakow, Poland]

Various market food products and products implicated in cases of food poisoning in Poland were examined for coagulase-positive (CP) staphylococci using Chapman's medium according to Polish Standard PN-65/A-04024. Cogulase-negative (CN) staphylococci were also determined. Total numbers of samples containing CP and CN staphylococci respectively at levels of ≥ 10/g or ml were as follows: milk and milk products (32 samples), 22 and 4; cheese brine (3 samples), 2 and 1; sausages and cured meat products (51 samples), 4 and 44; raw meat and meat stuffing (8 samples), 2 and 6; and delicatessen (6 samples), 2 and 2. CP and CN staphylococci were too numerous to count on 8 and 4 plates respectively, showing that where contamination is heavy, quantitative evaluation is not possible with this standard method which allows only 1:10 dilution. SKK

7 C 161
Food hygiene. Report on a Seminar convened by the Regional Office for Europe of the WHO, Warsaw, 18-22 August, 1970. [A book]
World Health Organization
67pp. (1971) [En] Copenhagen, Denmark: Author

Discussions at the Symposium are reported under the headings: Food-borne infections and intoxications of public health importance in the WHO European Region; Food hygiene problems and practices in different European countries; Food-borne diseases in relation to tourism; Food hygiene in relation to food industry; Requirements for food hygiene personnel and food handlers; Principles of administration and legislative measures in food hygiene; Role of international organizations in food hygiene; Conclusions. Annexes include details of: Technical visits; List of working documents; Food-borne infections and intoxications of public health importance in the WHO European region,

by E. H. Kampelmacher (pp. 40-51, 19 refs.); Review of information available to WHO on the notification of food infections and intoxications (pp. 52-58); Programme; Participants. JN

7 C 165

[Occurrence of a "protoxin" in aerobic spore-formers isolated from food.] Zur Frage des Vorkommens eines "Protoxins" bei aus Lebensmitteln isolierten aeroben Sporenbildern.
Hellmann, E.
Archiv für Lebensmittelhygiene **23** (3) 49-51 (1972) [7 ref. De, en]
[Landesveterinäruntersuchungsamt, Berlin, Germany]

Heat-inactivated organisms of the genus Bacillus were toxic to white mice when injected intraperitoneally. The toxicity increased by a factor of 1000-10 000 after treatment of the cells with trypsin. The LD_{50}, based on the dry wt. of the lyophilized material, was in the range 0.0004-0.0917 mg. The trypsinized organisms also had a toxic effect when suspended in milk and fed to white mice. The LD_{50} was increased ~100-fold compared to intraperitoneal application. Among the strains of Bacillus there were differences of toxicity independent of species. Immunological and serological studies showed that the strains with high toxicity, contrary to less toxic ones, have partially similar antigen structures after trypsinization. Of a total of 74 toxic strains isolated from food, and predominantly belonging to the species B. subtilis and B. licheniformis, 19 proved to be highly toxic. It is considered that the increase in toxicity brought about by a digestive enzyme plays a part in the outbreak of food-borne diseases caused by organisms of the genus Bacillus especially when the more toxic strains are involved. AS

7 C 169

[Possible food poisoning due to combined bacterial and nitrate-nitrite intoxication.]
Bolotov, M. P.; Soboleva, E. A.; Kalyagina, G. F.
Gigiena i Sanitariya **37** (4) 38-40 (1972) [5 ref. Ru, en] [Irkutskii Med. Inst., USSR]

Experiments carried out with broth cultures and beetroot juice showed that non-pathogenic and pathogenic strains of Escherichia coli (0-111), 5 types of salmonellae and staphylococci were capable of reducing nitrates to more toxic nitrites in the course of 24 h of incubation at 37° and 22°C. Proliferation of salmonellae and the pathogenic strains of E. coli in food products with high nitrate contents may cause a joint food poisoning due to both toxins and nitrate-nitrite intoxication with signs of methaemoglobinaemia. AS

7 C 174

Toxic chemicals in foods.
Falk, H. L.
Abstracts of Papers. American Chemical Society **163**: AGFD18 (1972) [En] [Nat. Inst. of Environmental Health Sci., PO Box 12233, Res. Triangle Park, N. Carolina 27709, USA]

Toxic chemicals covered in this review include: toxic compounds occurring naturally in foods, mycotoxins, bacterial toxins, pesticides and other trace contaminants, and food additives. The risk of cancer from high-calorie diets and the possibility of synergism between different types of toxic food components are discussed. JA

7 J 1241

[Multiplication of Clostridium botulinum type B in preserved mushroom sauce.]
Nikolaeva, S. A.; Mazokhina, N. N.
Voprosy Pitaniya **31** (2) 83-86 (1972) [9 ref. Ru, en] [Vses. Nauchno-issled. Inst. Konservnoi i Ovoshchesushil'noi Promyshlennosti, Moscow, USSR]

Samples of sterilized mushroom sauce (pH range, 4.1-5.0) were inoculated with vegetative cells or spores of No. 4 strain of Cl. botulinum type B at from 2×10^4 to 7×10^7/g and incubated at 37°C. It was found that vegetative cells were able to multiply to the extent of 2-4 orders of magnitude in the pH range 4.1-4.35, the toxin titre changing from ~10 min. lethal dose to values as high as 1000 min. lethal dose; in further incubation at 37°C, the toxin formed was progressively destroyed. Spores began to germinate only at pH 5. SKK

7 P 995

[9th conference held at Wolfpassing on 7 Oct. 1971. General theme: topical problems in butter anufacture.] 9. Fachtagung in Wolfpassing, am 7.10.1971. Generalthema: "Aktuelle Buttereiprobleme".
Anon.
Milchwirtschaftliche Berichte aus den Bundesanstalten Wolfpassing und Rotholz **1972** (30) 61-78 (1972) [7 ref. De]

Papers presented at this conference included: Modern methods of cream treatment for ripened-cream butter manufacture, by H. Haberkamp (pp. 61-64); Experiences concerning the capacity for storage of continuously produced ripened-cream butter, by H. Haberkamp (pp. 65-66); Butter cultures and their control, by H. Asperger (pp. 67-71, 17 ref.); Modern methods for the manufacture of pure cultures, by F. Hansen (pp. 73-74); and Food poisoning and its prevention, by E. Köppel (pp. 75-78, 17 ref.). [See FSTA (1971) **4** 3P363 for the 7th conference.] FL

8 C 188

Use of dogs as an assay for Clostridium perfringens enterotoxin.
Bartlett, M. L.; Walker, H. W.; Ziprin, R.
Applied Microbiology **23** (1) 196-197 (1972) [9 ref. En] [Dept. of Food Tech., Iowa St. Univ., Ames, 50010, USA]

3 techniques for using the dog as an assay organism for Cl. perfringens enterotoxin are described. These are believed to be more convenient than ligated ileal-loop procedures. AS

8 C 195

[Food hygiene.] Lebensmittelhygiene.

Anon. (**Germany, W.**, Deutsche Veterinärmedizinische Gesellschaft; **Austria**, Österreichische Gesellschaft der Tierärzte)

Alimenta **8** (2) 46-51 & (3) 73-74 (1969) [De]

The problem of whether results of individual analyses of boiling sausages for connective tissue, fat, protein, water and ash contents can be regarded as typical of whole batches, by D. Maier; Histological differentiation of fragments of external skin in sausages, by W. Thumser; Evaluation of canned goulash, by K. Gerigk; Determination of the proportion of muscle meat in products made from comminuted meat, by G. Krausse, G. Pfeiffer & H. Baas; Can incubated clear eggs be used as food?, by J. Kösters; Significance of psychrotrophic and psychrophilic bacteria for food hygiene, by W. Kundrat; Qualitative and quantitative aflatoxin determination by chemical and biological methods, by L. Bauer, H. R. Burmeister & L. Leistner; Enterotoxin-forming staphylococci in foods, by F. Untermann; Evaluation of the keeping qualities of meat products preserved by heating, by R. Heidtmann & -. Reichert; Bacterial content of commercial game, by K. Kniewaller; Bacteriological test methods for frozen fish, by K. E. Krüger; and Possibility of serological differentiation of fish, by C. Herrmann, A. Polymenides & D. Böhm. HBr

8 C 202

[Isolation of a new serotype of Clostridium perfringens from two outbreaks of food poisoning.]

Nakatsugawa, S.; Asakawa, Y.

Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] **11** (5) 347-351 (1970) [10 ref. Ja, en] [Shizuoka Public Health Lab., 3-68 Takajo-machi, Shizuoka, Japan]

2 outbreaks of food poisoning caused by heat-resistant Cl. perfringens, not related to Hobbs types 1-17, are described. The cause of the 1st outbreak was thought to be meat dumpling; and antiserum prepared against a strain isolated from this source agglutinated 31 of 62 strains isolated from faeces samples of the affected persons and 45 of 50 strains from faeces of persons affected in the 2nd outbreak. No food samples were available for examination in the 2nd outbreak. [From En summ.] CDA

8 C 203

[Poison in foods.]

Abramson, E.

Livsmedelsteknik **12** (1) 24-29 (1970) [Sv]

A general discussion of the problem of potential health hazards due to presence of chemicals etc. in food is given under various headings: what is a poison?, use of experimental animals, low dose rates, food hygiene, attempts at control, methods of combatting toxicity, individual variations, reciprocity, research, acute toxicity, long-term experiments, safety factors, experiments on humans, effect of age on toxic effects, temporarily acceptable intakes, impossibility of guaranteeing freedom of foods from toxic materials, and yes or no to additives? Some FAO/WHO publications on the subject are referred to in the text. HBr

8 C 208

[Epidemiology of infectious diseases of the alimentary tract in Poland with particular reference to 1960-1967. II. Food poisoning; amoebic dysentery.]

Anusz, Z.

Medycyna Weterynaryjna **25** (6) 349-350 (1969) [Pl] [ul. Piwarskiego 14 m. 13, Warsaw 36, Poland]

In 1960-1965, there were 707 outbreaks (1409 cases) of food poisoning due to fungi and 105 deaths. Corresponding figures for 1966 and 1967 were 308 (693) and 59, and 384 (690) and 45 respectively. Amanita phalloides, Helvella esculenta, Paxillus involutus and Cortinarius orelanus were the fungi most frequently involved. Total numbers of cases of food poisoning in 1960-1967 were respectively 6740, 6908, 7912, 10 919, 10 385, and (salmonellosis data not available) 6802, 8926 and 8936. Corresponding data for cases of salmonellosis were 1213, 969, 2189, 2663, 3514, and not available for 1965-1967. Corresponding data for botulism were 202, 204, 404, 295, 201, 252, 428 and 439. Meat was the causative agent in the majority of food poisoning outbreaks; milk and other foods were only sporadically responsible. SKK

8 C 209

[Bacillus cereus in the actiology of food poisoning in man.] [A review]

Zawadzki, Z.; Grimm, H.

Medycyna Weterynaryjna **27** (5) 294-297 (1971) [29 ref. Pl] [Katedra Higieny Produktow Zwierzecych, WSR, Olsztyn, Poland]

8 C 210

[Pathogenesis of Bacillus cereus food poisoning in man.] [A review]

Zawadzki, Z.; Grimm, H.

Medycyna Weterynaryjna **27** (6) 349-351 (1971) [28 ref. Pl] [Katedra Higieny Produktow Zwierzecych, WSR, Olsztyn, Poland]

8 P 1118

[Occurence and demonstration of enterotoxin-forming staphylococci in milk.] Zum Vorkommen

und Nachweis von enterotoxinbildenden Staphylokokken in Milch.
Terplan, G.; Zaadhof, K.-J.; Bobeth, S.
***Alimenta* 1971**: Special issue. Foods of animal origin 51-56 (1971) [103 ref. De] [Inst. für Milchkunde, Tierärztliche Hochschule, Hannover, German Federal Republic]

Literature on Staphylococcal enterotoxicoses caused by dairy products and methods of detecting enterotoxin-producing staphylococci in milk is reviewed. 136 coagulase-positive and 24 coagulase-negative strains isolated from quarter milk, supply milk and raw market milk were examined for enterotoxin formation. 13 of the coagulase-positive strains produced ≥1 toxins, which were identified as follows: enterotoxin A, 3; B, 2; C, 1; D, 5; and AB, 2. None of the coagulase-negative strains was toxigenic. The health hazard due to consumption of dairy products is discussed. RM

8 P 1160
[Enterotoxin-forming staphylococci in cheese.]
Enterotoxinbildende Staphylokokken in Käseproben.
Sinell, H.-J.; Mentz, I.
***Health Physics* 1971**: Special issue. Foods of animal origin 22-25 (1971) [34 ref. De] [Inst. für Lebensmittelhygiene der Freien Univ., 1 Berlin 33, Bitterstrasse 8-12, German Federal Republic]
See FSTA (1971) 3 9P1577.

8 P 1174
[Comparative studies on 200 staphylococcal strains from milk samples with increased cell content.]
Vergleichende Untersuchungen an 200 Staphylokokkenstämmen aus Milchproben mit erhöhter Zellzahl.
Klima, H.
***Milchwissenschaft* 27** (2) 87-89 (1972) [23 ref. De, en] [Staatliches VetUntersuchungsamt, Giessen, German Federal Republic]

200 strains of staphylococci isolated from milks with increased cell contents were examined. Numbers showing the different characteristics were: toxin formation, 102 α-, 14 β-, 61 α + β-, and 23 γ-toxin; mannitol fermentation, 189; plasma agglutination, 172 positive and 22 doubtful; hyaluronidase formation, 195; DNAase formation 192; pigment formation, 109 yellow, 69 white and 22 mixed. Numbers of antibiotic-resistant strains were: to penicillin, 81, to chloroamphenicol, 118; to streptomycin, 58; to erythromycin, 10; to neomycin, 22; and to oxytetracycline, 42. SKK

8 P 1178
Paralytic shellfish poisoning in eastern Canada.
Prakash, A.; Medcof, J. C.; Tennant, A. D.
Bulletin **1971** (177) 51-79 (1971) [Numerous ref. En] [Fisheries Res. Board, Marine Ecology Lab., Bedford Inst., Dartmouth, Nova Scotia, Canada]

The development of a test for the toxicity of paralytic shellfish poison to mice is considered. At first the toxin was extracted with alcohol but a quicker and simpler extractant was found to be aqueous acid. Accuracy of the tests depends on the strain of mice used and the individual animals, the injection technique and the poison level. Chemical and serological methods for detecting and measuring the poison are also given but they are unlikely to replace the mouse bioassay. The effects of cooking and commercial processing were determined; home cooking reduced the toxicity while commercial processing may either increase or decrease it. Canning reduced toxicity considerably. In order to make best use of shellfish resources the shellfish from various regions were sampled regularly and periods when it was safe to harvest them in each area were determined. Control problems include ignorance of the public and questions still to be solved by the investigators. It is difficult to forecast the presence of Gonyaulax tamarensis in the plankton and therefore the toxicity of the shellfish. RPC

9 C 229
Bacillus cereus: food poisoning organism. A review.
Goepfert, J. M.; Spira, W. M.; Kim, H. U.
***Journal of Milk and Food Technology* 35** (4) 213-227 (1972) [176 ref. En] [Food Res. Inst., Univ. of Wisconsin, Madison, 53706, USA]

This paper is devoted to a review of information pertinent to the role of Bacillus cereus as a food-borne pathogen. Primary emphasis is on the properties of B. cereus and published accounts of its involvement in animal and human disease. Methods for isolation, identification and enumeration are discussed. Research needs pertaining to recognition of the potential public health hazard and further investigation of the food poisoning syndrome are presented. AS

9 C 232
[9th Congress, Bad Nauheim, 25-27 March 1971.]
Bericht des 9. Kongresses, Bad Nauheim, 25-27 März 1971. [Conference proceedings]
Germany, W., Deutsche Veterinärmedizinische Gesellschaft
***Beiheft zum Tierärztlichen Umschau* 17**: 218pp. (1972) [Numerous ref. De]

Papers presented and discussed at this congress included the following: New theories on salmonella infections through food of animal origin, by D. Kuschfeldt (pp. 163-166); Occurrence of enterotoxinogenic staphylococci in humans and animals, and their significance in food hygiene, by F. Untermann (pp. 167-170, 13 ref.); Detection of salmonellae by fluorescence serology in foods [minced meat and chicken] of animal origin, by E.

Bulling (pp. 171-175); Problems of salmonellosis in poultry (results of a field experiment), by O. Pietzsch & E. Lorenz (pp. 184-188); Correlation between infection with group B streptococci in humans and cows, by G. Hahn, W. Heeschen, J. Reichmuth & A. Tolle (pp. 189-197, 33 ref.); Occurrence and hygienic significance of rickettsia (Coxiella burnetii) in foods of animal origin [milk, meat and offal], by E. Schaal (pp. 198-201, 17 ref.); Relationship between the nature of infection in a battery of laying hens and bacterial contamination of eggs and carcasses, by S. Matthes (pp. 202-206, 2 ref.); and Infection of flesh of freshwater fish with tapeworm larvae, by H.-H. Reichenbach-Klinke, F. Braun & R. D. Negele (pp. 210-214, 6 ref.). CDP

9 G 465
Facts behind the headlines.
Anon.
1547dc **No. 7**: 6-18 (1972) [19 ref. En]
Some background details are briefly presented under the headings: Vitamin C and the potato; Single-cell protein - which one do you mean?; Saccharin - the present position; Botulism; The occurrence and use of nitrates and nitrites in food. JN

9 M 1047
Chronic toxicity and carcinogenicity in mice of the purified mycotoxins, luteoskyrin and cyclochlorotine.
Uraguchi, K.; Saito, M.; Noguchi, Y.; Takahashi, K.; Enomoto, M.; Tatsuno, T.
Food and Cosmetics Toxicology **10** (2) 193-207 (1972) [42 ref. En, fr, de] [Dept. of Pharmacology, Fac. of Med., Univ. of Tokyo, Hongo, Japan]
Penicillium islandicum Sopp, an infectant of 'yellowed rice' produces 2 mycotoxins, luteoskyrin and a Cl-containing peptide, cyclochlorotine. Long-term feeding studies, initiated in 1960, have been carried out on the 2 mycotoxins. The results provide evidence that the 2 mycotoxins are responsible for the hepatotoxic and hepatocarcinogenic effects of yellowed rice. VJG

9 Q 137
Bacterial penetration of eggs.
Vadehra, D. V.; Baker, R. C.
New York's Food and Life Sciences **5** (1) 9-11 (1972) [7 ref. En] [Dept. of Poultry Sci., St. Agric. Expt. Sta., Ithaca, New York, USA]
Importance of the cuticle, which "clogs" the pores of the shell, in prevention of egg spoilage is noted. The shell allows passage of micro-organisms because of its porous nature, but the shell membranes, particularly the inner membrane, are a very effective barrier. Experiments have shown that penetration by bacteria is not caused by a digestive process. Electrical charge of the penetrating molecule has been shown to be critical; the more negative the charge on the molecule the faster the penetration. Chelating agents such as EDTA and penicillamine also increased permeability of the membranes. Some bacteria possess chelating agents which would benefit penetration. Current research involves determination of the growth mechanism of food poisoning bacteria and mycotoxic fungi in albumen, yolk and poultry meat. PG

9 R 451
Screening of toxic crabs in the Ryukyu and Amami islands.
Hashimoto, Y.; Konosu, S.; Inoue, A.; Saisho, T.; Mikaye, S.
Bulletin of the Japanese Society of Scientific Fisheries [Nihon Suisan Gakkai-shi] **35** (1) 83-87 (1969) [4 ref. En] [Lab. of Marine Biochem., Fac. of Agric., Univ., Tokyo, Japan]
A screening test for toxic crabs was carried out on a total of ~1000 specimens covering 72 species and 8 families. The presence of atexin in the 3 species Zosimus aeneus, Platypodia granulosa and Atergatis floridus was confirmed. No other species was toxic. AS

9 R 452
A further examination of the toxicity of three species of Xanthid crab.
Konosu, S.; Inoue, A.; Noguchi, T.; Hashimoto, Y.
Bulletin of the Japanese Society of Scientific Fisheries [Nihon Suisan Gakkai-shi] **35** (1) 88-92 (1969) [5 ref. En] [Lab. of Marine Biochem., Fac. of Agric., Univ., Tokyo, Japan]
The toxicity of 3 species of Yanthid crab, Zosimus aeneus, Platypodia granulosa and Atergatis floridus, was determined by a mouse bioassay method. The toxin was detected in the specimens caught at various places around Japan, and a remarkable variation of toxicity was observed in each species. The appendages were usually more poisonous than the cephalothorax. No obvious difference in lethality was observed between male and female, while a distinct local variation of toxicity was seen. Z. aeneus was more toxic than the other 2 species. AS

9 R 457
Occurrence of gigantotoxin and gigunterin in gigantotoxic fishes in the Ryuku and Amami Island.
Hashimoto, Y.; Yasumoto, T.; Kamiya, H.; Yoshida, T.
Bulletin of the Japanese Society of Scientific Fisheries [Nihon Suisan Gakkai-shi] **35** (3) 327-332 (1969) [8 ref. En] [Lab. of Marine Biochem., Fac. of Agric., Univ. of Tokyo, Bunkyo-ku, Japan]

The presence of ciguatoxin was confirmed in some of the ciguatoxic fishes in the Ryukyu Islands, besides ciguaterin previously found in a grouper. The coexistence of ciguatoxin and ciguaterin was also demonstrated in the muscle of Lutjanus monostigma and the liver of L. bohar. The distribution of ciguaterin was examined using cats as test animals. The liver of all specimens was almost always moderately or strongly toxic, but the muscle rarely and weakly toxic. Ciguaterin was also detected in the gonads of L. bohar. Chromatographic behaviour and pharmacological actions of ciguatoxin in L. bohar from Ryukyu Islands were identical to those of ciguatoxin in L. bohar from the South Pacific. AS

9 R 464
Toxicity of a xanthid crab, Zosimus aeneus, and several other species in the Pacific.
Konosu, S.; Noguchi, T.; Hashimoto, Y.
Bulletin of the Japanese Society of Scientific Fisheries [Nihon Suisan Gakkai-shi] 36 (7) 715-719 (1970) [7 ref. En] [Lab. of Marine Biochem., Fac. of Agric., Univ., Tokyo]

Toxicity of Zosimus aeneus from various Pacific islands was determined. Specimens from Ishigaki, Marcus and Rangiroa islands had greater or lesser toxicity, but those from Espiritu Santo and American Samoa islands were not toxic. Carpilius maculatus, C. convexus, Eriphia sebana, Ocypode ceratophthalma and Mictyris longicarpus were found to be non-toxic. HBr

9 S 1154
Enteritis due to Salmonella panama from infected ham.
Bailey, G. K.; Fraser, P. K.; Ward, C. P.; Bouttell, G.; Kinnear, E.
Journal of Hygiene 70 (1) 113-119 (1972) [16 ref. En] [Public Health Lab., Ipswich, Suffolk, UK]

Baked hams were implicated as the source of an outbreak of enteritis caused by Salmonella panama. Sewer swabs in factory drains proved positive for S. panama; no pathogens were isolated from working surfaces or 1 day's bacon production. Stool samples showed one worker to be a symptomless excretor; after his removal from meat handling duties, no further infections were reported from the district, and sewer swabs were negative. Some wk. later, outbreaks of S. panama infection in London and Southend were traced to ham from the same source. S. panama was isolated from a baking oven, meat packing equipment and a conveyor; 6 out of 47 cold-stored hams contained S. panama. Examination of workers revealed 3 cases of enteritis and 82 symptomless excretors. After installation of new equipment and modification of work-flow, no further outbreaks of enteritis were traced to the product, and no further isolations of S. panama were obtained from the factory or personnel. The source of infection at the factory is unknown. AJDW

9 S 1189
Effect of toxin concentration on the heat inactivation of staphylococcal enterotoxin A in beef bouillon and in phosphate buffer.
Denny, C. B.; Humber, J. Y.; Bohrer, C. W.
Applied Microbiology 21 (6) 1064-1066 (1971) [9 ref. En] [Nat. Canners Assoc. Res. Foundation, Washington, DC 20036, USA]

The slope of the thermal inactivation curve of enterotoxin A in beef bouillon (initial pH 6.2) was found to be approx. 27.8°C (50°F) with 3 different concn. of toxin. Inactivation by heat was dependent on the concn. of enterotoxin A heated. Enterotoxin A was inactivated by less heat in a pH 7.2 phosphate buffer than in beef bouillon as detected by serology. Results indicate that natural (usually low) levels of toxin rather than conc. enterotoxin A should be used in heat inactivation studies. AS

10 A 444
[An apparatus for micro-slide immuno diffusion.]
Eine Apparatur für die Micro-Slide-Immundiffusion.
Langner, H. J.
Fleischwirtschaft 52 (1) 61-64 (1972) [5 ref. De, en, fr] [Inst. für Lebensmittelhygiene, Freie Univ., 1000 Berlin 33, Bitterstrasse 8-12, Germany]

An apparatus is described for micro-immunodiffusion, capable of detecting 0.0005 µg antigenic protein. It can be used for detection of milk, soybean or egg protein, and staphylococcal enterotoxin in food. RM

10 C 243
Bacterial contamination of food.
White, J. C.
Cornell Hotel and Restaurant Administration Quarterly 13 (1) 37-42 (1972) [En] [Dept. of Food Sci., St. Coll. of Agric. & Life Sci., Cornell Univ., New York, USA]

Types of food-poisoning, bacterial multiplication of aerobic organisms (Salmonella, Staphylococcus), anaerobic organisms (Clostridium perfringens, Cl. botulinum), prevention of food contamination with reference to changes in storage temp., human sanitation and transfer of pathogens are generally discussed. Survival rates of Salmonella senftenberg in relation to time and temp. are tabulated. Vibrio comma and Vibrio parahaemolyticus (with the incidence of the latter in fish foods in Japan and in the USA) are briefly mentioned. OA

10 C 249
Hygiene and food production. [A book]
Fox, A. (Editor)
ix+176pp. ISBN 0 7000 1521 3 (1971) [182 ref. En] London, UK: Churchill Livingstone. Price £2.00 [Polytechnic of the South Bank, London, UK]

The contribution to this volume, which are based

on the papers presented at a symposium on Hygiene and Food Production held at Borough Polytechnic on 23-24 March 1970, are in 4 sections. Food hygiene and the individual, the first section, includes: Person hygiene, by R. L. Ferguson (pp.2-8, 3 ref.); Food poisoning, by R. J. Gilbert, (pp. 9-25, 66 ref.); and Food hygiene legislation, by M. Parry (pp. 27-38). The two papers in the second section, Hygiene and primary foods are: Hygiene control of plant foods during transport and storage, by R. G. Tomkins (pp. 40-57, 11 ref.) and Hygiene and flesh foods, by R. Spencer (pp. 59-74, 18 ref.). In the third section, covering Hygiene and processed foods, the papers are as follows: Hygiene and meat products, by E. J. Dyett (pp. 76-84, 11 ref.); Hygiene in the dairy industry, by J. G. Davis (pp. 85-106, 52 ref.); The hygienic production of bread and flour confectionery, by D. A. L. Seiler (pp. 107-117, 5 ref.); and The control of Salmonella in broiler chickens, by W. E. Crabb and M. Walker (pp. 119-131, 8 ref.). Finally, the section on Environmental hygiene in relation to food production includes papers on: Design and operation of food plant, by D. T. Shore and R. Jowitt (pp. 134-142); Detergents and biocides, by R. Thompson (pp. 143-154, 12 ref.); and Pest control in the food industry, by A. M. Shenker (pp. 155-170, 4 ref.). A 6 page subject index is included. AB

10 C 250

[Diagnosis of staphylococcal food poisoning.]

Diagnostik der Staphylokokken-Lebensmittelvergiftung.

Untermann, F.

Fleischwirtschaft **52** (4) 500-503 (1972) [33 ref. De, en, fr] [Inst. für Lebensmittelhygiene, 1000 Berlin 33 (Dahlem), Bitterstrasse 8-12, German Federal Republic]

The position as regards diagnosis of staphylococcal food poisoning is summarized. There are difficulties associated with selective culture of enterotoxin-forming staphylococci from foods, as there is no known medium which adequately inhibits accompanying flora and at the same time permits detection of at least 2 suitable biochemical criteria (suitable criteria are formation of coagulase, lysozyme and DNase and the egg-yolk reaction). A micro-agar gel diffusion test has been found reliable as a method of detecting enterotoxins. The use of a dialysis culture is recommended for detection of toxins in staphylococci strains. Direct enterotoxin detection in foods remains problematical in view of the time and effort involved and can thereforeonly be used in isolated cases. It should be used for a final diagnosis where it is suspected that there are enterotoxins present, although no staphylococci have been found by bacteriological methods. AS

10 C 253

[Nutrition 71. Pollution and its effect on foods.]

[Conference proceedings]

Debray, J.-R. (Chairman)

Cahiers de Nutrition et de Dietetique **6** (3) 23-82 (1971) [35 ref. Fr]

The following papers, presented on 21 April 1971, are included: Pollution - a new myth, by J. Tremolieres (pp. 25-28, 1 ref.); Pathogenic and toxin-producing microorganisms in foods, by R. Buttiaux (pp. 29-30); Pesticides in humans, by E. Fournier (pp. 31-35, 2 ref.); Toxins of fungal origin, by P. Lafont (p. 36); Residues in animal nutrition, by R. Ferrando (pp. 37-47, 32 ref.); Some recent work in the area of food toxicology, by R. Truhaut (p. 48); Substances formed during certain heat and radiation treatments, by J. Causeret (pp. 49-51); Plastics in contact with foods, by R. Lefaux (pp. 52-54); The destruction of plastics food packaging materials, by G. Le Moan (pp. 55-58); Dangerous foods and nutritional imbalance, by J. Tremolieres (pp. 59-62); The concern of consumers, by F. Custot (pp. 62-65); Precautions taken by producers, by J. Colas (pp. 66-67); Research on additives, pesticides and pollutants of foods, by R. Derache (pp. 68-69); The contribution of research towards protection from pollution, by P. Manchon & R Lowy (pp. 70-71); and Protection brought about by regulations against the pollution of foods, by R. Souverain (pp. 75-78). A short discussion of the subject is included. SAC

10 R 571

[Studies of bacterial growth on kumbu and of the growth of food poisoning bacteria inoculated in kombu extract.]

Oishi, K.; Oka, S.

Bulletin of the Japanese Society of Scientific Fisheries [Nihon Suisan Gakkai-shi] **37** (10) 976-980 (1971) [8 ref. Ja, en] [Lab. of Seafood Chem., Fac. of Fisheries, Hokkaido Univ., Hakodate, Japan]

Kombu, a palatable seaweed of the Laminariaceae, is used in Japan as a seasoning for soups or vegetables. The soup is especially rich in nutrients suitable for bacterial growth. Studies were therefore made of the bacteriological quality of kombu. Salmonella enteritidis, Staphylococcus aureus, Vibrio parahaemolyticus, Clostridium perfringens and Cl. botulinum, were inoculated into kombu extract or an artificial kombu medium. When bacterial counts of kombu extract were compared with those of the artificial medium, no remarkable differences were observed for any of the bacterial species. Judging from experimental results, attention should be paid to contamination with Salm. enteritidis and Staph. aureus. With respect to the other 3 food poisoning species, the extract was considered to be relatively safe. AS

11 C 261

[The enterotoxin of Clostridium perfringens type A and its role in food poisoning.] Das Enterotoxin

von Clostridium perfringens Typ A und seine Rolle bei Lebensmittelvergiftungen. [A review]
Hauschild, A. H. W.
Fleischwirtschaft **52** (7) 873-875 (1972) [44 ref. De, en, fr] [Res. Lab., Food and Drug Directorate, Tunney's Pasture, Ottawa 3, Ontario, Canada]

11 C 270
[Microbiological examinations of fully cooked meals.] Mikrobiologische Untersuchungen von Fertiggerichten.
Mohs, H. J.
Gordian **72** (6) 203-205 (1972) [4 ref. De, en]
The technology and microbiology (including test methods) of fully cooked meals are discussed. The following limits are suggested, to be used as directives only: total aerobes $<10^5$/g, coliforms $<10^2$/g, E. coli not demonstrable in 1 g, salmonellae not demonstrable in 30 g, spore forming aerobes $<10^4$ g, sulphite reducing spore forming organisms $<10^3$/g, coagulase positive staphylococci $<10^3$/g, faecal streptococci $<10^3$/g. Evaluation of hygienic quality of products should take account of both total and specific counts and the technology of the production method. RM

11 C 272
[Problems in preparation of pure staphylococcal enterotoxin A.] Probleme bei der Reindarstellung des Staphylokokken-Enterotoxins A.
Langner, H.-J.
Fleischwirtschaft **51** (8) 1229-1234 (1971) [1 ref. De & En, fr] [Inst. für Lebensmittelhygiene, Freie Univ., 1000 Berlin 33 (Dahlem), Bitterstrasse 8-12, German Federal Republic]

11 C 274
[Food poisoning due to bacterially contaminated food.] Vergiftungen durch bakteriell verunreinigte Nahrungsmittel.
Kendereski, S.
Fleischwirtschaft **51** (9) 1326-1328 (1971) [29 ref. De, en, fr] [Tech. Fac., Karnegijeva 4, Belgrade, Yugoslavia]
The etiology of the most important types of food poisoning is examined. Bacterial food poisoning is divided into 4 categories: (i) endotoxins of facultative pathogenic and saprophytic bacteria, (ii) bacteria of the Salmonella group, (iii) bacterial exotoxins (botulism), (iv) amine bases, chiefly histamine derived from bacterial decomposition of proteins. Pathogenesis, symptoms and course of food poisoning are described. RM

11 R 638
[Toxin production by Clostridium botulinum type E in radiation pasteurized fish.]
Ando, Y.; Karashimada, T.; Ono, T.; Iida, H.
Food Irradiation [Shokuhin-Shosha] **4** (1) 11-17 (1969) [9 ref. Ja, en] [Hokkaido Inst. of Public. Health, Sapporo, Japan]
Herring homogenates were inoculated with 10^5 spores of Cl. botulinum type E/g, irradiated at 0, 0.1 and 0.3 Mrad and stored at 20° or 10°C. Total volatile bases, total bacterial counts, and oxidation-reduction potential were periodically determined and the relation between these indices in irradiated samples was compared with that in unirradiated controls. Toxin production in unirradiated samples occurred so rapidly that there seems to be no significant difference between time for development of toxin and spoilage time, whilst toxin production in irradiated samples began before appearance of signs of spoilage. More toxin was produced in irradiated samples than in unirradiated ones. The fact that radiation pasteurization apparently enhances growth and toxin production of Cl. botulinum type E in herring homogenates is discussed with reference to the oxidation-reduction potential. AS

11 S 1459
[Staphylococcal enterotoxin A poisoning caused by pig's head in aspic.] Schweinskopf in Aspik als Ursache einer Staphylokokken-Enterotoxin-A-Vergiftung.
Baumgart, J.; Untermann, F.; Heidtmann, R. H.
Fleischwirtschaft **52** (4) 476 (1972) [6 ref. De, en, fr] [Fachhochschule Lippe, 4920 Lemgo 1, Lindenhaus, German Federal Republic]
A case of staphylococcal food poisoning (enterotoxin A) following consumption of pig's head in aspic (pH 4.6) is used to illustrate that low pH of meat products provides only limited protection, as toxin formation can occur before multiplication of lactobacilli lowers the pH to ≤5.0. This reduces the staphylococcal count but does not destroy pre-formed toxin. RM

12 B 112
Microbiology of foods and food processing. [A book]
Nickerson, J. T.; Sinskey, A. J.
x+306pp. ISBN 0 444 00124 7 (1972)
[Numerous ref. En] New York, USA: American Elsevier Publishing Co. Inc. [Dept. of Nutr. & Food Sci., Massachusetts Inst. of Tech., Cambridge, USA]
This comprehensive book, which will be of interest to food manufacturers, caterers and studetns of food science, hotel management and home science, is aimed at providing an understanding of pertinent information concerning the microbiology of foods, food processing and food-borne diseases. Because of the wide area of subject matter covered, material which is interesting but not absolutely essential to the understanding of the various subjects has not been

included. It contains general chapters, each with its own list of references, on methods of the microbiological examination of foods, destruction of bacteria by heat, microbiology of dried food, growth of microorganisms in foods at refrigerator temp. above freezing, chemical preservation of foods, food infections, food intoxications, and sanitation in food manufacturing plants and in preparation and serving establishments; there are also 3 chapters on specific groups of foods, namely flesh-type foods and eggs, fruit and vegetables, and dairy products. CDP

12 C 291

[Hygienic importance of some food contaminants.]

Smolyar, V. I.

Gigiena i Sanitariya **37** (9) 78-83 (1972) [52 ref. Ru] [Kievskii Nauchno-issled. Inst. Gigieny Pitaniya, USSR]

This is a review of some major biological agents and chemical substances causing contamination of foods, and covers various microorganisms (salmonellae, Clostridium botulinum, enterococci), mould spores, fungi, aflatoxins, nitrites, Hg and 3,4-benzopyrene. HBr

12 C 299

[Food poisoning caused by Staphylococcus aureus, Clostridium perfringens, Bacillus cereus and Salmonella spp.]

Hauge, S.

Norsk Veterinaertidsskrift **83** (11) 582-584 (1971) [8 ref. No. en] [Inst. for Naeringsmiddelhygiene, Norges Veterinaerhogskole, Oslo, Norway]

12 J 1870

[Factors affecting Clostridium botulinum contamination of vegetables intended for preservation and of materials used.]

Rozanova, L. I.; Zemlyakov, V. L.; Mazokhina, N. N.

Gigiena i Sanitariya **37** (8) 102-103 (1972) [3 ref. Ru] [Vses. Nauchno-issled. Inst. Konservnoi i Ovoshchesushil'noi, Promyshlennosti, Moscow, USSR]

Samples of (i) soil from fields under cabbage, vegetable marrow, parsley, carrot, onion, eggplant and potato crops in Samarkand oasis, (ii) irrigation ditch water and (iii) cabbage, carrot, onion, tomato, potato, horse-radish leaves, green dill and green parsley taken 1-7 days after harvesting as well as (iv) some vegetables during processing were examined for presence of Cl. botulinum (CB). 79 of 300 (i) samples (26.4%) contained CB spores at ≥1 spore/20 g. CB type A was present in 68 samples, CB type B in 19 samples (in 8 in association with type A), and CB type C in 2 samples. It is believed that CB types D, E and F were also present. (ii) contained CB types A and B: 13 of 30 (iii) samples contained CB spores: type A spores were present in 11 samples and type B were present in 7. Stringent washing of vegetables intended for preservation is considered as the basis of botulism prophylaxis in vegetable product factories; recommendations on washing machines and their use for different vegetables are presented, cabbage being said to require particular attention. Possibility of (iv) contamination by spore penetration through the seal from cooling water into sterilized glass jars in the autoclave is pointed out. SKK

Additional Services available from IFIS

RETROSPECTIVE SEARCH SERVICE

- Over 60,000 documents in FSTA searched
- State-of-the-art or "quicky" telephone requests accepted
- Annual contracts with discount available
- Cost from £5 per volume of FSTA for references; £7.50 per volume for abstracts
- Information available in 3 output formats
- Searches conducted by qualified food science graduates

PHOTOCOPYING SERVICE

- All journal articles abstracted in FSTA available promptly
- Cost 7p per page for single orders
- Deposit account service in operation
- Original articles available as output from retrieval services at 40p per article.

See also inside front cover

FOOD ANNOTATED BIBLIOGRAPHIES

Selected abstracts from Food Science and Technology Abstracts on important specialized aspects of food science and technology are now available as Food Annotated Bibliographies (FABs).

The FABs already completed are listed below, and further FABs are in preparation. Suggestions are welcomed for specific topics for additional bibliographies.

FAB	Title	No. Ref.	Price	Vol. 1-3	No. Ref.	Price	Vol. 4	Vol. 5 (1973) Monthly (12 issues)
1.	Application of Reverse Osmosis to Food Processing	104	£2.00	☐	58	£2.00	☐	£4.00 ☐
2.	New Sources of Food Protein	662	£6.00	☐	332	£3.50	☐	£9.00 ☐
3.	Natural and Synthetic Sweeteners	338	£3.50	☐	198	£2.00	☐	£6.00 ☐
4.	Techniques for Analysis of Flavour Volatiles	367	£4.00 *	☐	237	£2.50	☐	£7.00 ☐
5.	Microwaves in Food Processing	160	£2.00	☐	103	£2.00	☐	£5.00 ☐
6.	Texture Analysis of Foods	426	£4.50 *	☐	429	£4.50	☐	£11.00 ☐
7.	Synthetic Dairy Products	150	£2.00	☐	88	£2.00	☐	£4.00 ☐
8.	Acidulants in Foods	413	£4.50	☐	200	£2.50	☐	£7.00 ☐
9.	Agglomeration of Powders	73	£2.00	☐	34	£2.00	☐	£4.00 ☐
10.	Aseptic Packaging	131	£2.00	☐	79	£2.00	☐	£4.00 ☐
11.	EEC Regulations	55	£2.00	☐	64	£2.00	☐	£4.00 ☐
12.	Toxicology of Food Additives	118	£2.00	☐	106	£2.00	☐	£5.00 ☐
13.	Deep Fat Frying	400	£4.00	☐	248	£2.50	☐	£7.00 ☐
14.	Viscosity of Foods	399	£4.00	☐	212	£2.50	☐	£7.00 ☐
15.	Taste Panels in Food Science	78	£2.00	☐	86	£2.00	☐	£4.00 ☐
16.	Taints in Foods	126	£2.00	☐	77	£2.00	☐	£4.00 ☐
17.	Microbial Toxins in Foods	113	£2.00	☐	87	£2.00	☐	£4.00 ☐
18.	Smoked Food Products	249	£2.50	☐	112	£2.00	☐	£5.00 ☐
19.	Disposal of Waste Food Products	395	£4.00	☐	262	£3.00	☐	£8.00 ☐
20.	Use of Glucose in Food Products	124	£2.00	☐	99	£2.00	☐	£4.00 ☐
21.	Emulsifiers in Foods	253	£3.00	☐	161	£2.00	☐	£6.00 ☐
22.	Stabilizers in Food	222	£2.50	☐	250	£3.00	☐	£8.00 ☐
23.	Staling and Anti-staling Additives	58	£2.00	☐	25	£2.00	☐	£4.00 ☐
24.	Catering Industry	51	£2.00	☐	29	£2.00	☐	£4.00 ☐
25.	Antioxidants (in preparation)							
26.	Nitrosamines	31	£2.00	☐	32	£2.00	☐	£4.00 ☐

*Vol. 1-2 only

☐ Suggested topics for FABs.....

SDI and Retrospective Searches

The International Food Information Service is now able to provide selective dissemination of information and retrospective searches.

☐ I require an SDI/Retrospective Search on the following topics.

Please send me an estimate.....

Prices include postage by surface mail. For airmail rates, please apply to the address below.

To order, or to obtain further information, mark the item required, add your name and address, and send cash, cheque or postal order to:

International Food Information Service,
Commonwealth Bureau of Dairy Science and Technology,
Shinfield, Reading RG2 9AT, England.

Name .....

Address .....

.....

.....